

BRIEF DESCRIPTION OF THE DRAWING

[0011] A fuller understanding of the present invention and the features and benefits thereof will be accomplished upon review of the following detailed description together with the accompanying drawings, in which:

[0012] FIG. 1 shows a layered article including a single crystal silicon substrate, a thin silicon oxynitride layer ($\text{Si}_3\text{N}_4\text{O}_2$) disposed on the silicon substrate, and a single crystal Group III-N layer, according to an embodiment of the invention.

[0013] FIG. 2 is an equilibrium phase-diagram for the Ga-N-O-Si system.

[0014] FIGs. 3(a) and ³(b) are ESCA spectra for silicon annealed at 900°C in 1 slm of N_2 with 100 % NH_3 at 1 slm and without NH_3 , respectively.

[0015] FIGs. 4(a) and ⁴(b) are ESCA spectra of the Si $2p_3$ peak for silicon annealed at 900°C in 1 slm of N_2 with 100 % NH_3 at 1 slm and without NH_3 , respectively.

[0016] FIGs. 5(a) and ⁵(b) are ESCA spectra of Si $2p_3$ peak for silicon annealed at 560°C in 1 slm of N_2 with 100 % NH_3 at 1 slm and without NH_3 , respectively.

[0017] FIG. 6 is a low resolution XRD spectra for GaN on Si (111).

[0018] FIG. 7 is a high resolution XRD spectrum for GaN grown on Si (111).

[0019] FIG. 8. is an AFM of GaN grown on (111) Si.

[0020] FIG. 9 is a room temperature photoluminescence (PL) spectrum of GaN grown on Si(111) at 560°C.

[0021] FIG. 10 shows a SEM of low-temperature MOCVD/HVPE GaN showing a silicon oxynitride layer.

[0022] FIGs. 11(a) and ¹¹(b) show high resolution TEM images showing about a 2 nm oxynitride layer formed at the substrate/film interface for GaN on Si(111) for 560°C MOVPE followed by 560°C HVPE.

[0023] FIGs. 12(a)-¹²(c) show high resolution TEM images showing an oxynitride layer formed at the substrate/film interface for GaN on Si(111) for 900°C MOVPE.

[0024] FIG. 13 is SIMS depth profile data indicating the formation of a silicon oxynitride layer at the GaN/Si interface for GaN grown on Si(111) at T = 850°C.